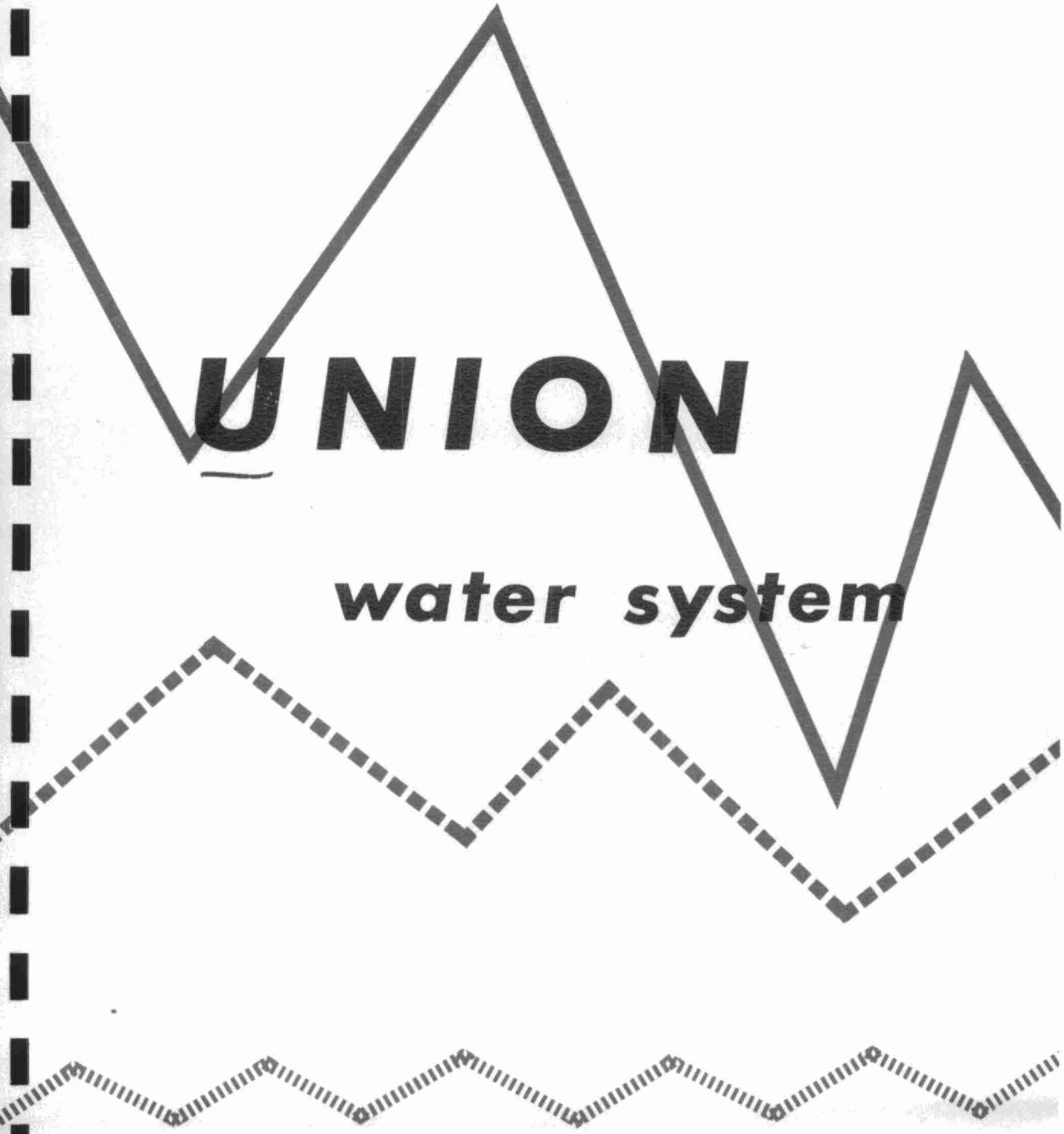
OPERATING SUMMARY



UNION

water system

1968

ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

Copyright Provisions and Restrictions on Copying:

This Ontario Ministry of the Environment work is protected by Crown copyright (unless otherwise indicated), which is held by the Queen's Printer for Ontario. It may be reproduced for non-commercial purposes if credit is given and Crown copyright is acknowledged.

It may not be reproduced, in all or in part, for any commercial purpose except under a licence from the Queen's Printer for Ontario.

For information on reproducing Government of Ontario works, please contact ServiceOntario Publications at copyright@ontario.ca

Water management in Ontario

Ontario
Water Resources
Commission

135 St.Clair Ave.W.
Toronto 7
Ontario

We are pleased to present you with the Operating Summary for the water treatment facilities operated for you during 1968.

Both the financial and technical information presented should be of assistance to your present and future planning in this important phase of municipal activity.

A new format has been devised to allow greater readability with equally detailed content. We trust that this will meet with your approval.

Our staff wish to express their appreciation for your co-operation throughout the year.

Caverly
D. S. Caverly,
General Manager.

DMcTavish
D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

LIBRARY COPY
JUN 20 1968
ONTARIO WATER
RESOURCES COMMISSION

COPY #1

ONTARIO WATER RESOURCES COMMISSION

CHAIRMAN
Dr. James A. Vance

VICE-CHAIRMAN
J. H. H. Root, M. P. P.

COMMISSIONERS
H. E. Brown
D. A. Moodie
L. E. Venchiarutti

GENERAL MANAGER
D. S. Caverly

ASSISTANT GENERAL MANAGERS
L. E. Owers
K. H. Sharpe
F. A. Voege
A. K. Watt

COMMISSION SECRETARY
W. S. MacDonnell

DIVISION OF PLANT OPERATIONS

Director
D. A. McTavish

Assistant Director
C. W. Perry

Regional Supervisor
P. J. Osmond

Operations Engineer
R. E. Brown

135 St. Clair Avenue West
Toronto 7

UNION

water system

operated for the

TOWN OF LEAMINGTON
TOWN OF ESSEX
TOWNSHIP OF GOSFIELD NORTH
TOWNSHIP OF GOSFIELD SOUTH
TOWNSHIP OF MAIDSTONE
TOWNSHIP OF MERSEA
H. J. HEINZ COMPANY OF CANADA LIMITED

by the

ONTARIO WATER RESOURCES COMMISSION

1968 ANNUAL OPERATING SUMMARY

FOREWORD

● This operating summary outlines the project's technical capabilities and financial status in 1968. Such information mirrors past and present performance, but a major intention is to anticipate the future -- to solve problems before they occur.

The new format in which this year's data are presented is designed to offer a higher level of readability than in the past, without a corresponding decrease in compactness, accuracy and detail.

Although your Regional Operations Engineer carries the major responsibility for the contents of the report, those involved in its preparation are attached to several Commission sections and divisions. The statistics section of the Division of Plant Operations compiled the information for the graphs and charts. The draughting section of the Division of Sanitary Engineering drew the graphs. The Division of Finance provided all cost data.

Only the close co-operation of these departments allowed the publication of this summary.

CONTENTS

Title Page i
Foreword ii
'68 Review 1
Project Costs 2
Operating Costs 5
Process Data 10
Conclusions . . . . Inside back cover

'68 REVIEW

The total system operating cost of $138,846.83 was higher than in 1967 by $7,474.84 or 5%. The production cost of water over the past nine years has ranged from 7.24 to 9.37 cents per 1000 gallons, the increased unit cost in 1968 being due both to increased operating costs and lower flows as a result of a wet summer. These costs are based on the common area operating cost and the metered water to all participants. The nine-year average cost is 8.16 cents per 1000 gallons.

The total output of the Union Water System in 1968 decreased by 3.2% from the 1967 water production. Consumption was up for three participants and was down for the other four. Gosfield South experienced the largest percentage change at -19.03%. Maximum demands on the plant occurred during late August and were again critical for periods of two to ten days. A critical period did not occur in June as it had in 1967, as there was ample rainfall in the period during which heavy irrigation is practiced.

Raw water turbidities again held steady, and better than 99% removal was experienced. Chlorine demands were up slightly indicating a slight deterioration in the quality of the raw water from 1967.

The plant is staffed by 10 men, headed by superintendent H. Sanger. Coverage is given 24 hours per day.

At the Chief Operators' conference in October, Mr. Sanger accepted on behalf of the staff, a certificate for the best operated water treatment plant within the Ontario Water Resources Commission.

No major treatment, mechanical, or electrical problems were encountered during the year. However, the reduction in staff to nine men while one was sick for several months put a severe strain on the remaining staff. When the full staff was again on duty, a renovation program involving complete repainting was initiated and essentially completed by the end of the year. All reports from Ontario Water Resources Commission head office technical staff indicated that the equipment was also being maintained in excellent condition.

Some progress was made towards expansion of the plant when early in the year, the draft agreement was approved by each participant. Later, the Ontario Municipal Board approved the expansion. By the end of the year, the firm of C. G. Russell Armstrong, Consulting Engineers, had prepared preliminary plans and specifications for the expansion, which will include a new low lift pump, an additional microstrainer and a clarifier.

PROJECT COSTS

NET CAPITAL COST (Estimated)	$3,841,799.96

Note: The participants' share of net capital cost varies each year on the basis of consumption.

DEBT RETIREMENT BALANCE AT CREDIT (Sinking Fund) December 31, 1968

Essex	$ 73,395.63
Leamington	117,672.31
H. J. Heinz	158,548.17
Gosfield North	12,093.55
Gosfield South	24,894.70
Mersea	45,254.52
Maidstone	12,854.16
TOTAL	$ 444,713.04

1968 COSTS TO EACH PARTICIPANT

TOTAL

Essex	$ 70,445.78
Leamington	110,704.70
H. J. Heinz	157,934.74
Gosfield North	13,618,33
Gosfield South	31,816.64
Mersea	52,710.58
Maidstone	13,033.10
	$ 450,263.87

NET OPERATING

Essex	$ 19,091.12	
Leamington	36,989.97	
H. J. Heinz	53,018.11	
Gosfield North	3,453.03	
Gosfield South	9,236.74	
Mersea	14,856.62	
Maidstone	2,201.24	
		$138,846.83

DEBT RETIREMENT

Essex	$ 12,170.08	
Leamington	17,013.59	
H. J. Heinz	23,532.75	
Gosfield North	2,854.12	
Gosfield South	7,280.73	
Mersea	11,530.56	
Maidstone	3,145.17	
		$ 77,527.00

RESERVE

Essex	$ 3,054.40	
Leamington	3,299.82	
H. J. Heinz	4,835.29	
Gosfield North	794.72	
Gosfield South	2,247.73	
Mersea	3,218.37	
Maidstone	747.98	
		$ 18,198.31

INTEREST CHARGED

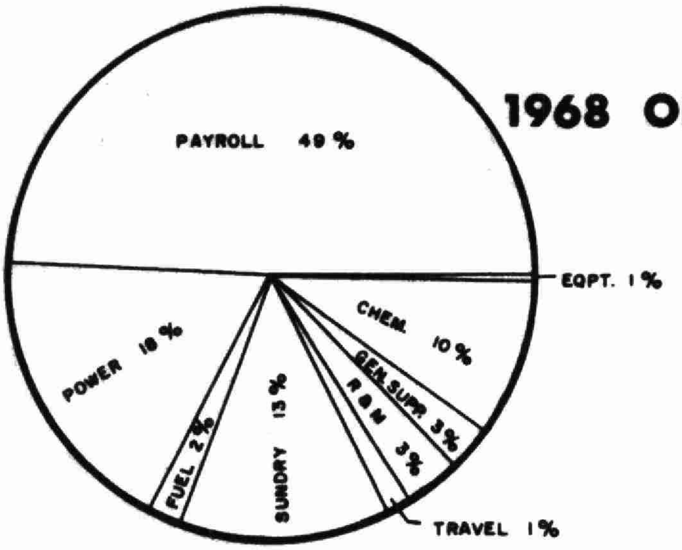
Essex	$ 36,130.18	
Leamington	53,401.32	
H. J. Heinz	76,548.59	
Gosfield North	6,516.46	
Gosfield South	13,051.44	
Mersea	23,105.03	
Maidstone	6,938.71	
		$215,691.73
TOTAL COST		$450,263.87

Monthly Operating Costs

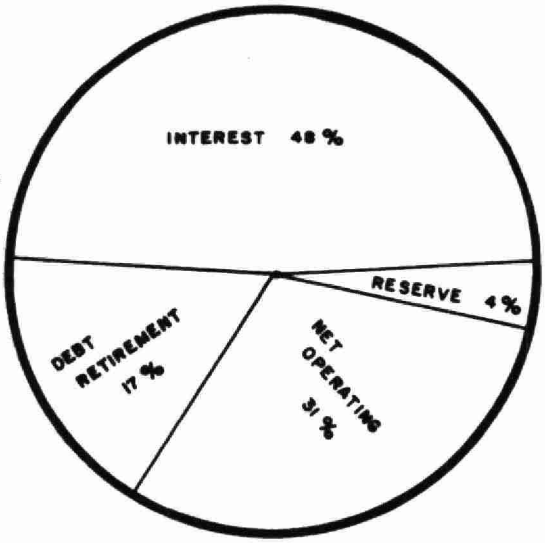
MONTH	TOTAL	PAYROLL	CASUAL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY	TRAVEL
JAN	7154.59	4599.65	-	-	1928.03	-	289.33	3.25	210.04	124.29	-
FEB	8732.90	4612.12	-	434.71	1725.29	-	255.91	251.80	1170.18	127.87	155.02
MAR	10909.37	6794.95	-	441.64	1694.29	439.11	395.91	49.25	225.02	787.08	82.12
APRIL	9388.60	4679.90	-	395.38	1872.32	1330.84	283.86	-	560.61	143.82	121.87
MAY	7490.34	5020.11	24.00	375.14	(160.23)	1372.46	295.94	-	65.25	233.80	263.87
JUNE	7576.05	4752.45	-	189.32	-	1503.46	220.57	30.01	458.80	120.40	301.04
JULY	13860.96	4929.39	-	89.00	6018.50	1462.88	446.92	-	606.91	182.23	125.13
AUG	10636.96	7636.63	67.28	5.09	-	2203.58	108.38	-	322.98	199.52	93.50
SEPT	11929.79	5289.76	-	33.55	4689.72	880.00	267.22	-	531.47	55.25	182.82
OCT	10534.10	5161.24	-	59.34	2696.86	1934.82	320.55	-	44.31	130.11	186.87
NOV	11139.06	5084.34	-	121.59	2295.28	623.54	276.50	-	271.98	2281.71	184.12
DEC	27930.77	9262.17	-	542.71	2129.71	1313.76	597.28	238.88	99.65	13584.19	162.42
TOTAL	137283.49	67822.71	91.28	2687.47	24889.77	13064.45	3758.37	573.19	4567.20	17970.27	1858.78
UNION EAST	430.71				130.71					300.00	
UNION WEST	1132.63				796.71					335.92	
GRAND TOTAL	138846.83	67822.71	91.28	2687.47	25817.19	13064.45	3758.37	573.19	4567.20	18606.19	1858.78

Brackets indicate credit

1968 OPERATING COSTS



TOTAL ANNUAL COST



Yearly Operating Costs

Year	MG TO CONSUMERS Based on Area Meters	TOTAL COST (Common Area)	COST IN CENTS Per Thousand Gallons
1960	1052. 40	* $ 76, 239. 89	7. 24
1961	1229. 63	* 91, 448. 77	7. 44
1962	1332. 42	* 101, 472. 98	7. 62
1963	1402. 83	108, 469. 94	7. 73
1964	1359. 37	123, 993. 16	9. 12
1965	1538. 25	122, 797. 19	7. 98
1966	1486. 51	123, 341. 12	8. 30
1967	1506. 65	130, 349. 36	8. 65
1968	1465. 52	137, 283. 49	9. 37

* These costs include eastern and western areas.

PLANT OUTPUT
in millions of gallons

MONTH	TOTAL FLOW	MAXIMUM DAY FLOW	MINIMUM DAY FLOW	AVERAGE DAILY FLOW	CUMULATIVE TOTAL
January	98. 883	4. 043	1. 707	3. 190	98. 883
February	90. 770	4. 150	1. 760	3. 130	189. 653
March	97. 756	3. 881	1. 817	3. 153	287. 409
April	106. 257	4. 690	2. 001	3. 542	393. 666
May	119. 387	5. 337	1. 526	3. 851	513. 053
June	146. 909	6. 941	2. 320	4. 897	659. 962
July	150. 084	6. 855	2. 947	4. 841	810. 046
August	173. 651	7. 795	3. 101	5. 602	983. 697
September	164. 603	7. 087	3. 139	5. 487	1148. 300
October	127. 926	5. 884	2. 274	4. 127	1276. 226
November	111. 695	6. 887	1. 904	3. 723	1387. 921
December	97. 937	4. 213	1. 710	3. 159	1485. 858
Total	1485. 858			487. 020	
Average	123. 822	5. 647	2. 184	4. 058	

COMMENTS

During 1968, a total of 1485. 858 million gallons of water were treated and pumped from the plant as measured by meter No. 1. It should be noted that this reading is slightly more than the cumulative readings of the area meters. The difference is 1. 4% and is attributed mainly to meter discrepancies and line losses.

The total plant output for 1968 is down approximately 3. 2% from 1967. The average daily flow of 4. 058 million gallons represents 53. 4% of plant design capacity (7. 6 MGD). The maximum daily flow of 7. 795 million gallons represents 102% of plant design capacity.

CONSUMPTION OF PARTICIPANTS

PARTICIPANT	CONSUMPTION (MG)									% OF TOTAL								
	1960	1961	1962	1963	1964	1965	1966	1967	1968	1960	1961	1962	1963	1964	1965	1966	1967	1968
GOSFIELD S.	16.34	37.79	51.74	74.96	75.01	99.12	87.37	102.66	83.12	1.6	2.0	3.9	5.4	5.5	6.4	5.9	6.81	5.67
GOSFIELD N.	9.95	13.13	21.60	29.53	23.35	30.06	32.93	31.06	35.82	0.9	1.1	1.6	2.1	1.7	1.9	2.2	2.06	2.44
MERSEA	55.70	79.35	99.51	137.71	127.96	168.38	158.53	165.23	160.61	5.3	6.5	7.4	9.8	9.4	11.0	10.7	10.97	10.96
LEAMINGTON	335.00	399.91	404.41	455.70	407.97	449.94	416.38	416.57	391.85	31.8	32.5	30.5	32.5	30.0	29.2	28.0	27.65	26.74
HEINZ	500.00	534.50	557.04	520.40	541.00	595.00	594.00	572.23	573.48	47.5	43.5	41.8	37.1	39.8	38.8	40.0	37.98	39.13
ESSEX	130.00	158.58	190.04	177.07	174.46	177.72	179.12	195.49	197.82	12.4	12.9	14.3	12.6	12.8	11.5	12.0	12.96	13.50
MAIDSTONE	5.41	6.37	8.45	7.46	9.52	18.03	18.19	23.42	22.82	0.5	0.5	0.6	0.5	0.8	1.2	1.2	1.55	1.56
TOTAL	1052.40	1229.63	1332.42	1402.33	1359.37	1538.25	1486.51	1506.65	1465.52	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.00

COMMENTS

Consumptions of the Townships of Gosfield S., Gosfield N., Mersea and Maidstone have better than trebled since 1960, while the consumption of Essex, Leamington and Heinz has increased at the most by about a third. Each participant's share of the total consumption has remained in its same relative position since 1960, with Heinz being the largest user at approximately 39% and Maidstone the smallest at about 1.6% of the total consumption in 1968. There were no major changes in 1968 over the 1967 percentages.

PARTICIPANT	AGREED ANNUAL MINIMUMS * ORIGINAL	** REVISED	ANNUAL CONSUMPTIONS 1960	1961	1962	1963	1964	1965	1966	1967	1968	AGREED DAILY MAXIMUMS	1968 MONTHLY RATE CALCULATED DAILY
	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	1000 GALS.	1000 GALS.
H.J. HEINZ	520.0	520.0	500.0	534.5	557.0	520.4	541.0	535.0	554.[illegible]	572.2	**573.5**	3500	2080
LEAMINGTON	426.0	400.0	335.0	399.9	404.0	455.7	408.0	443.6	413.4	416.6	**391.8**	2100	1620
ESSEX	160.0	160.0	130.0	158.6	190.0	177.1	174.5	177.7	179.1	195.5	**197.8**	752	725
MERSEA	12.5	70.0	55.7	79.8	99.5	137.7	126.0	168.7	158.5	165.2	**160.6**	40	679
GOSFIELD S	16.5	40.0	16.3	37.3	51.8	74.9	75.0	93.1	87.4	102.7	**83.1**	60	420
GOSFIELD N	23.5	20.0	10.0	13.1	21.6	29.5	23.3	30.1	32.9	31.1	**35.8**	80	213
MAIDSTONE	12.0	10.0	5.4	6.4	9.5	7.5	9.6	10.1	1[illegible]	20.4	**22.8**	45	82
TOTAL	1176.5	12[illegible]	[illegible]2.4	122[illegible].6	1302.4	1402.8	1359.4	153[illegible].2	14[illegible].5	15[illegible].3	**1465.5**	6577	5300

* AS PER ORIGINAL AGREEMENT
** REVISED EFFECTIVE JANUARY 1, 1963

COMMENTS

The tabulation above shows the evolution of both agreed minimum and maximum flow requirements of each participant since the system was put into operation. It is especially significant to note that in 1968 the Townships of Mersea, Gosfield South and Maidstone used more than twice their guaranteed minimums and that Mersea, Gosfield South and Gosfield North consumed on an average daily basis water many times in excess of their agreed daily maximum. Leamington failed to use their 400 mg allotment in 1968 and had their lowest consumption since 1960.

UNION WATER SYSTEM

1968 FLOW DATA

ADJUSTED MONTHLY FLOWS BY PARTICIPANT

Flows expressed in Million Gallons (MG)

Month	Gosfield South	Mersea	Leamington	Essex	Maidstone	Gosfield North	Heinz	Total
January	3.781	7.884	21.902	15.255	1.683	2.462	47.585	100.552
February	3.575	7.455	20.708	14.424	1.591	2.327	42.131	92.211
March	5.740	11.457	23.124	13.652	1.550	2.221	36.936	94.680
April	6.530	13.035	26.307	15.531	1.764	2.527	37.232	102.926
May	9.480	18.113	30.202	13.631	1.843	2.165	45.042	120.476
June	12.588	24.049	40.101	18.099	2.446	2.874	47.295	147.452
July	8.645	17.986	44.816	20.020	1.969	2.452	46.039	141.927
August	9.706	20.192	50.314	22.476	2.210	2.752	56.498	164.148
September	7.774	13.286	48.086	20.973	2.168	6.397	62.359	161.043
October	5.657	9.668	34.992	15.263	1.577	4.655	53.292	125.104
November	5.247	9.511	27.893	15.494	2.186	2.711	51.289	114.331
December	4.401	7.978	23.400	12.998	1.833	2.274	47.782	100.666
Totals 1968	83.124	160.614	391.845	197.816	22.820	35.817	573.480	1465.516
Totals 1967	102.661	165.231	416.570	195.486	23.420	31.058	572.228	1506.654
% Diff. 68/67	-19.03	-2.79	-5.94	+1.19	-2.56	+15.32	+0.22	-2.73

COMMENTS

The chart of Adjusted Flows is merely a monthly representation of the bimonthly flow determinations as per meter readings taken by participants and the plant staff. The difference between 1968 and 1967 consumption by participant is shown on the last line. The peak month for each participant is underlined.

Process Data

TOTAL CONSUMPTION

Graph No. 1 shows the peak monthly flow lower than in 1967 and the total annual flow down slightly. The peak month occurred in August when 164.148 million gallons were pumped. This represents an average daily flow of 5.3 MG which is 69.5% of the plant capacity.

H. J. HEINZ

Graph No. 2 shows that the total annual flow was close to the 1967 flow. The peak occurred in September, one month after the plant peak.

LEAMINGTON

Graph No. 3 indicates a decrease in total annual flow, and a reduction in the monthly peak flow. The peak occurred in August coincident with the plant peak.

ESSEX

Graph No. 4 shows that the annual flow has increased slightly. The monthly peak again decreased slightly and occurred in August coincident with the plant peak.

MERSEA

Graph No. 5 indicates that the monthly peak in 1968 was down somewhat from 1967 and again occurred in June. The total annual flow decreased slightly.

GOSFIELD SOUTH

Graph No. 6 shows a considerable decrease in both monthly peak and total annual flow. The peak again occurred in June and was off the plant peak.

GOSFIELD NORTH

Graph No. 7 shows an increase in both peak monthly flow and total annual flow. The peak occurred in September.

MAIDSTONE

Graph No. 8 shows a decrease in both peak monthly flow and total annual flow. The peak occurred in June.

PEAK DEMAND AS A PERCENTAGE OF DESIGN CAPACITY

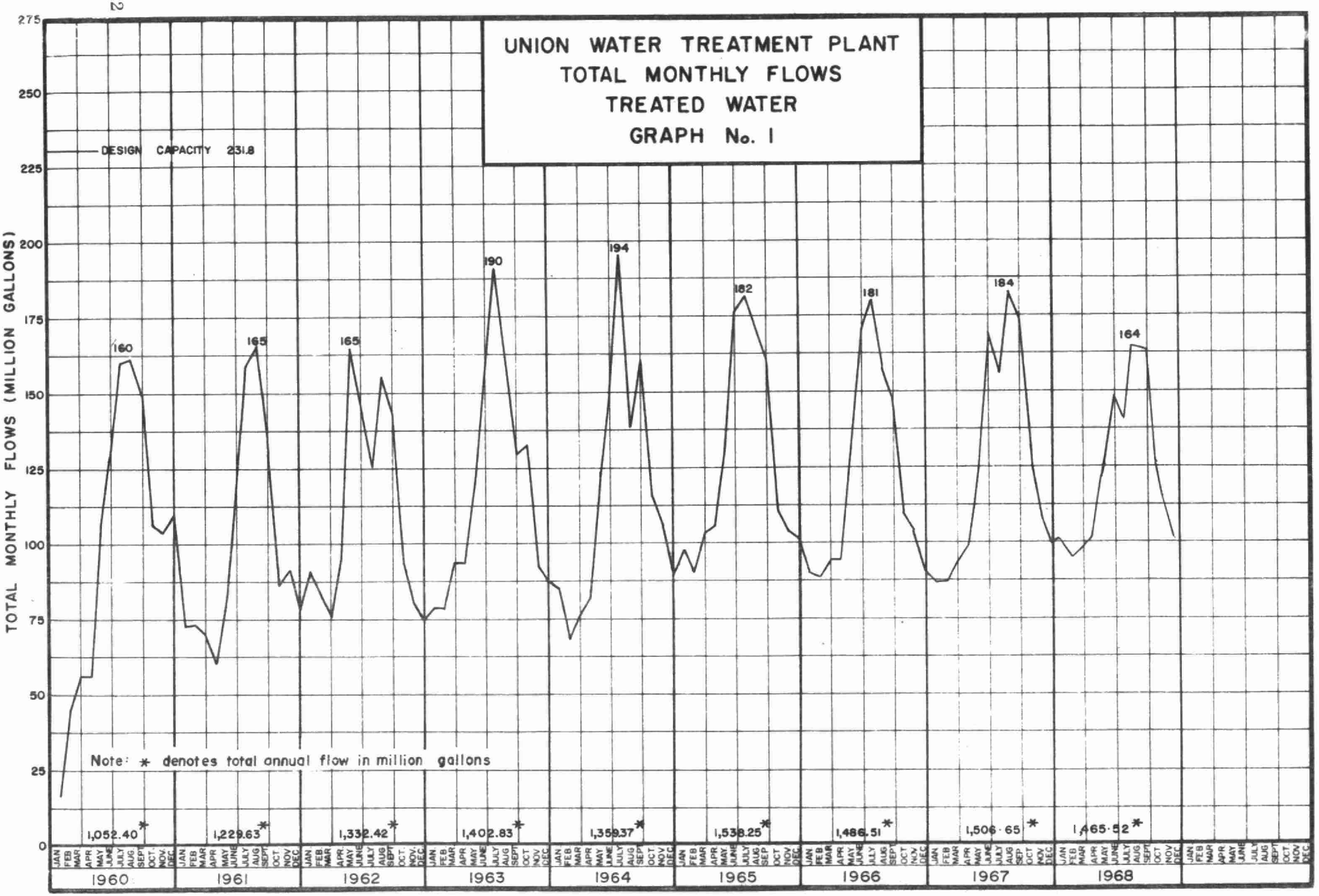
Graph No. 9 shows that in 1968, the peak demands on the plant were critical for periods of from two to ten days. The peak demands were not as high as the 1967 values due to a wet season during the irrigation period. The 1968 periods of critical flow were as follows:

1 day	-August 29th	81% of capacity
2 days	-August 28th to 29th	90% of capacity
3 days	-August 28th to 30th	93% of capacity
4 days	-August 27th to 30th	94% of capacity
5 days	-August 26th to 30th	93% of capacity
6 days	-August 26th to 31st	92% of capacity
10 days	-August 22nd to 31st	87% of capacity

In addition to the above, the highest rates for the 4, 6 and 12 hour periods occurred on August 29th which did not correspond to the day of highest plant output.

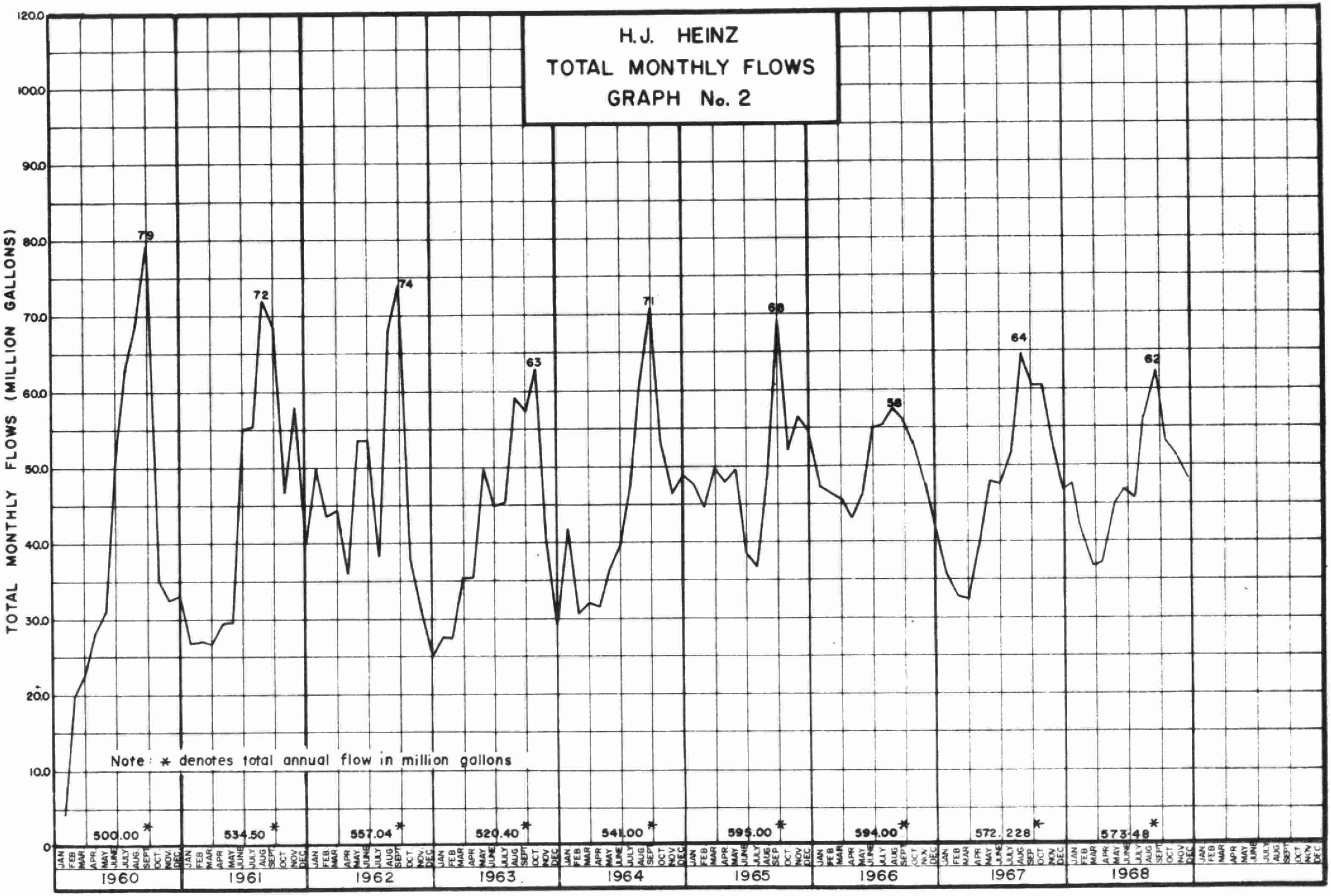
PROBABILITY OF DAILY FLOWS

Graph No. 10 shows that in 1968, the treated water flows exceeded the design capacity of 7.6 MGD about one percent of the time as compared to 7.5% of the time in 1967, to 3.2% of the time in 1966 and 5.2% of the time in 1965. Graph No. 11 shows the average flows for each year.

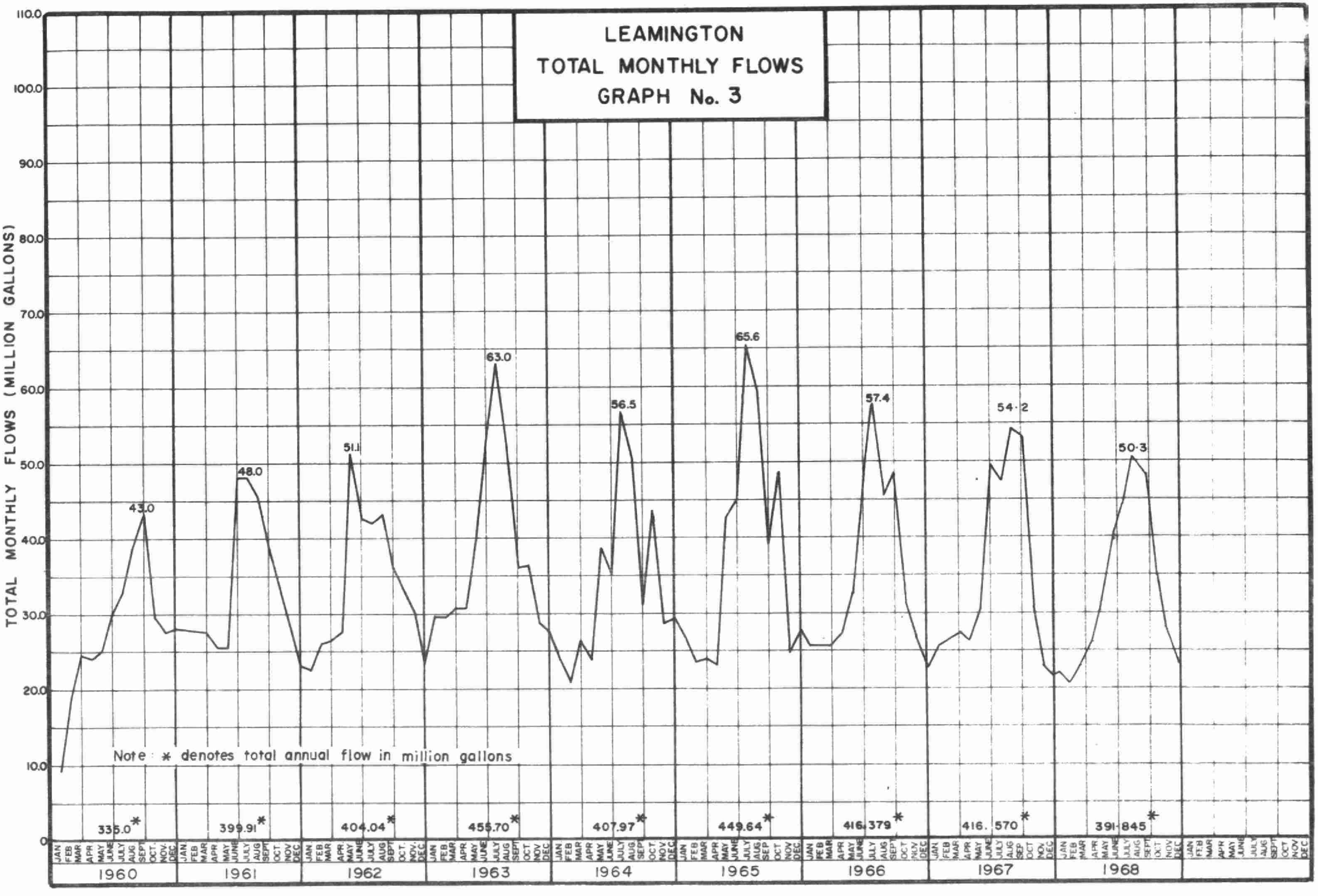


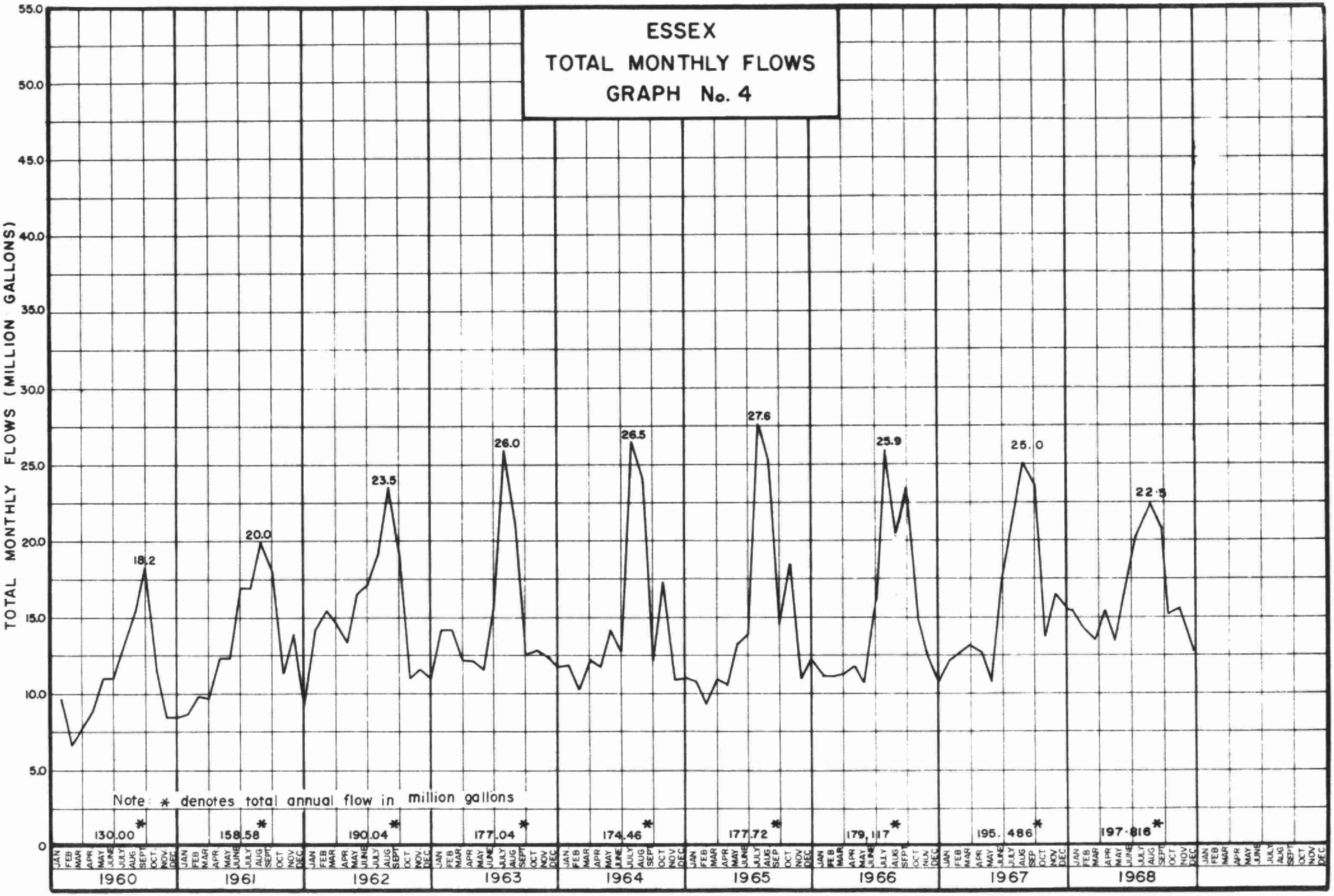
UNION WATER TREATMENT PLANT
TOTAL MONTHLY FLOWS
TREATED WATER
GRAPH No. 1

Note: * denotes total annual flow in million gallons



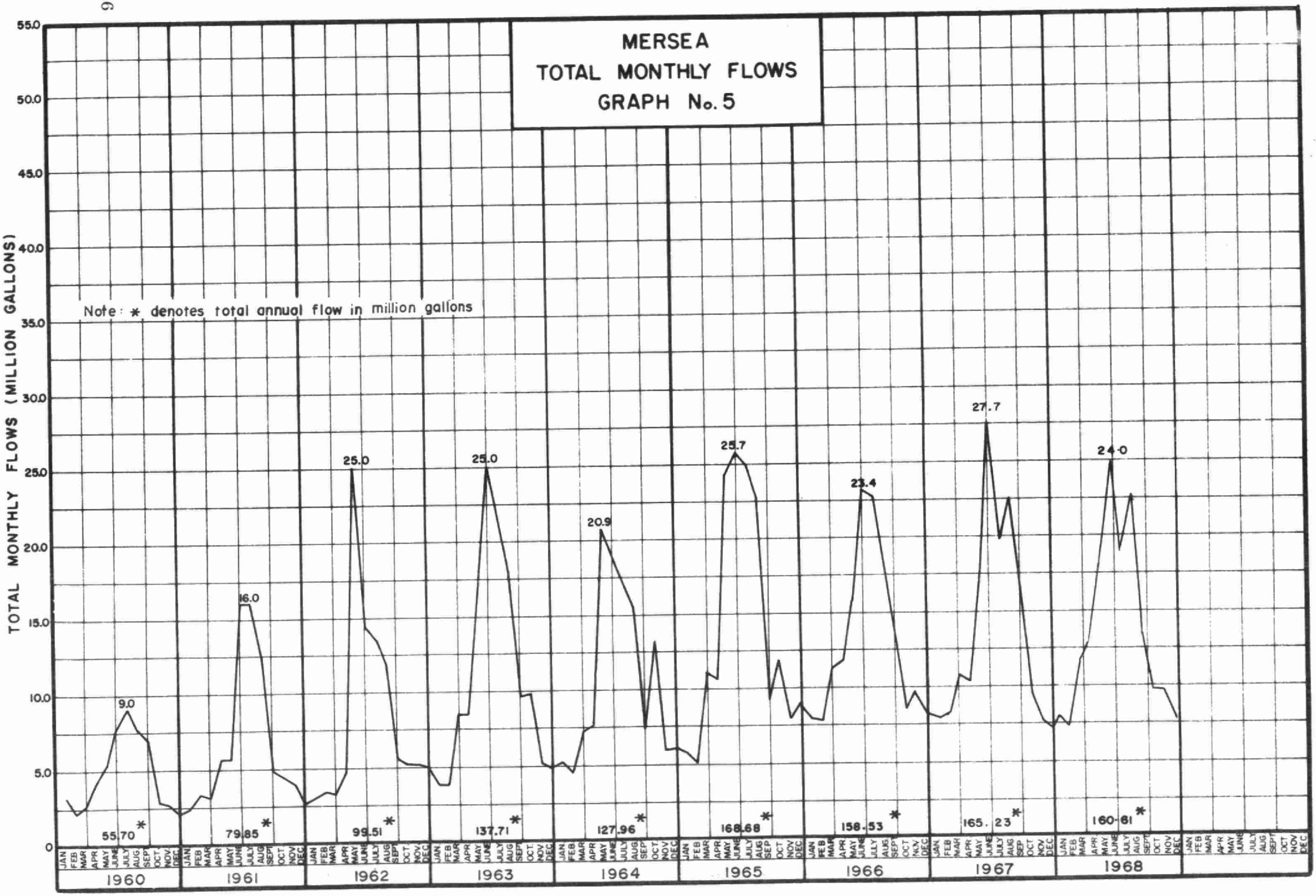
H.J. HEINZ
TOTAL MONTHLY FLOWS
GRAPH No. 2

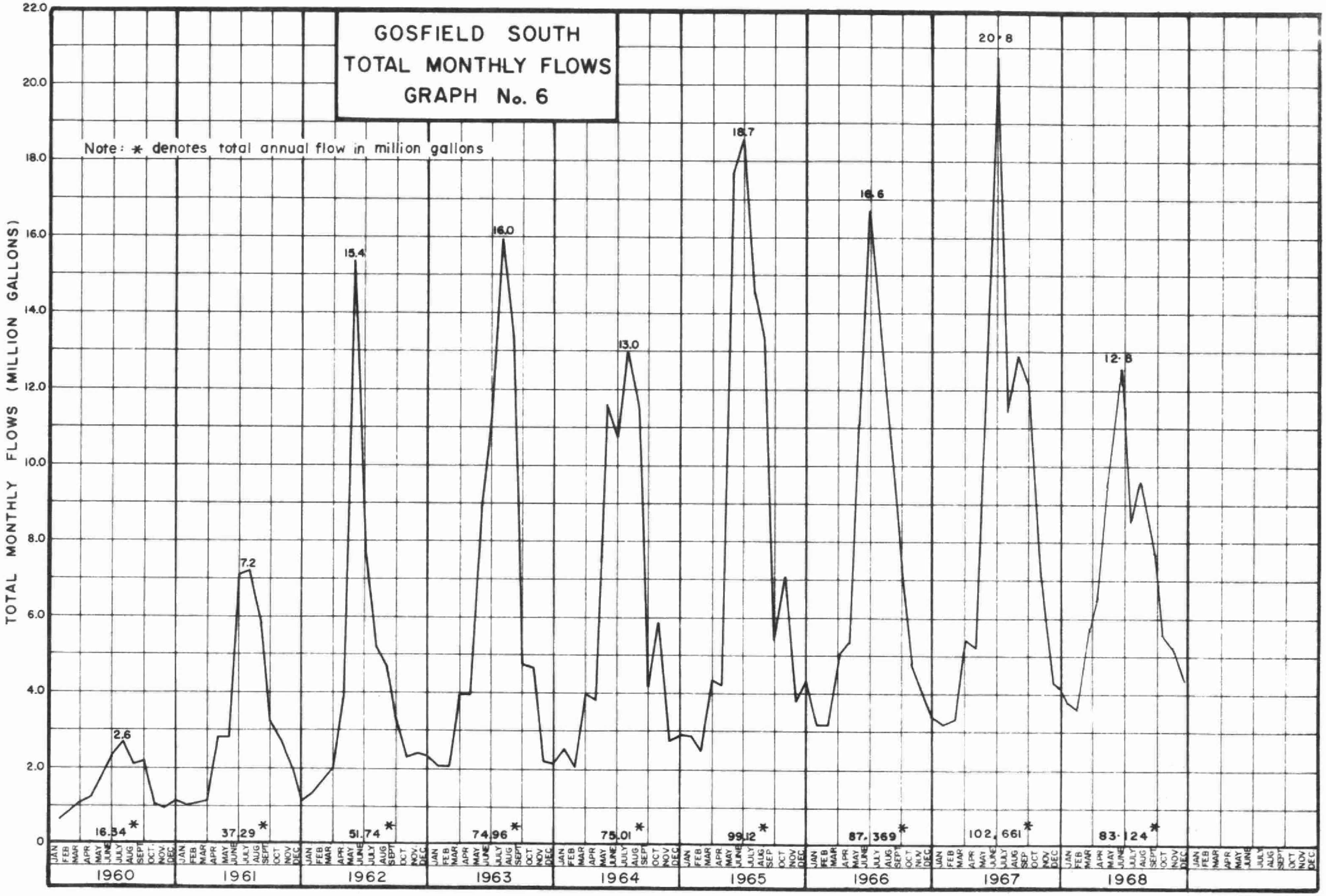

LEAMINGTON
TOTAL MONTHLY FLOWS
GRAPH No. 3
TOTAL MONTHLY FLOWS (MILLION GALLONS)
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
43.0
48.0
51.1
63.0
56.5
65.6
57.4
54·2
50·3
Note : * denotes total annual flow in million gallons
335.0*
399.91*
404.04*
455.70*
407.97*
449.64*
416.379*
416. 570*
391·845*
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT. NOV. DEC
1960
1961
1962
1963
1964
1965
1966
1967
1968

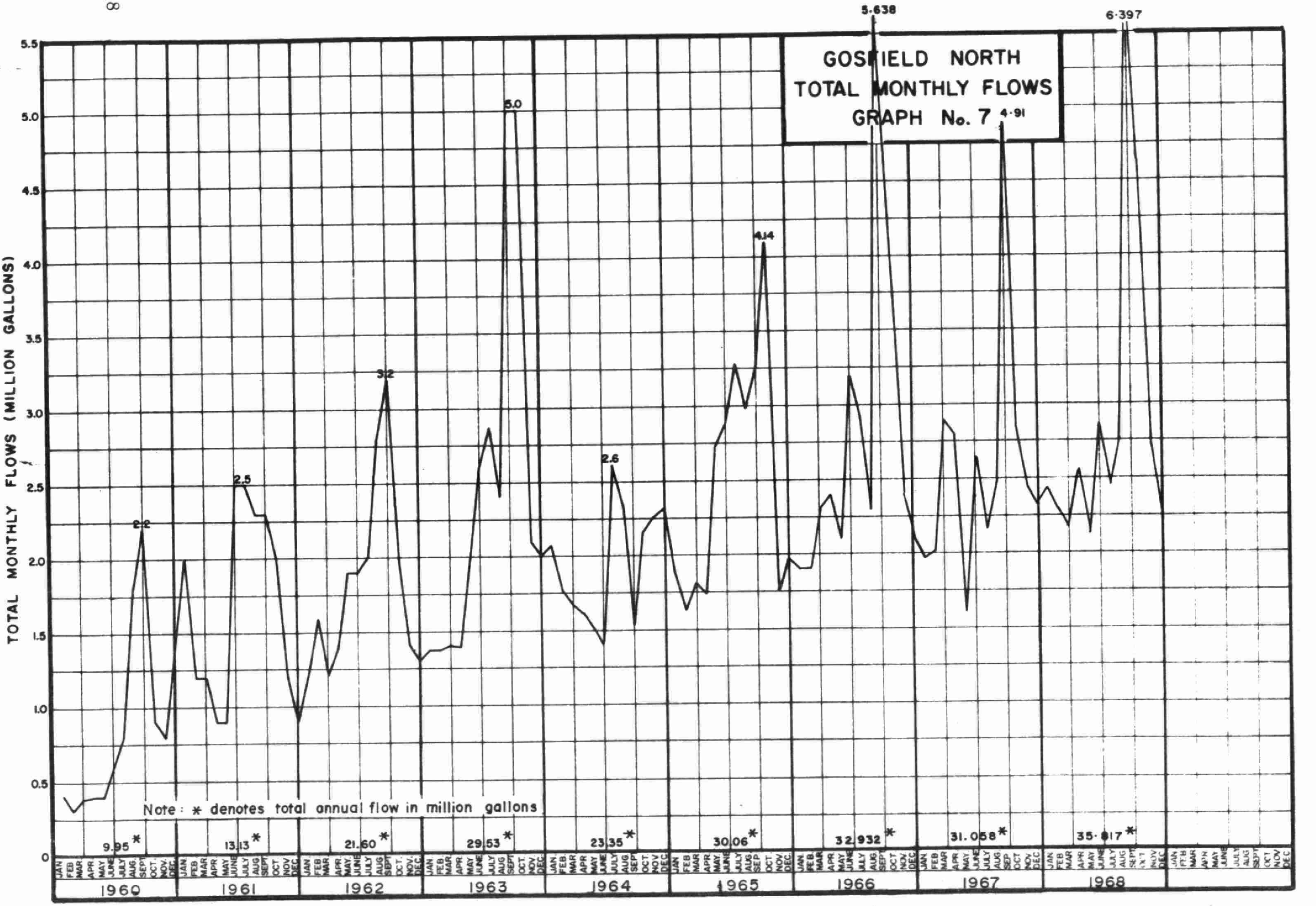


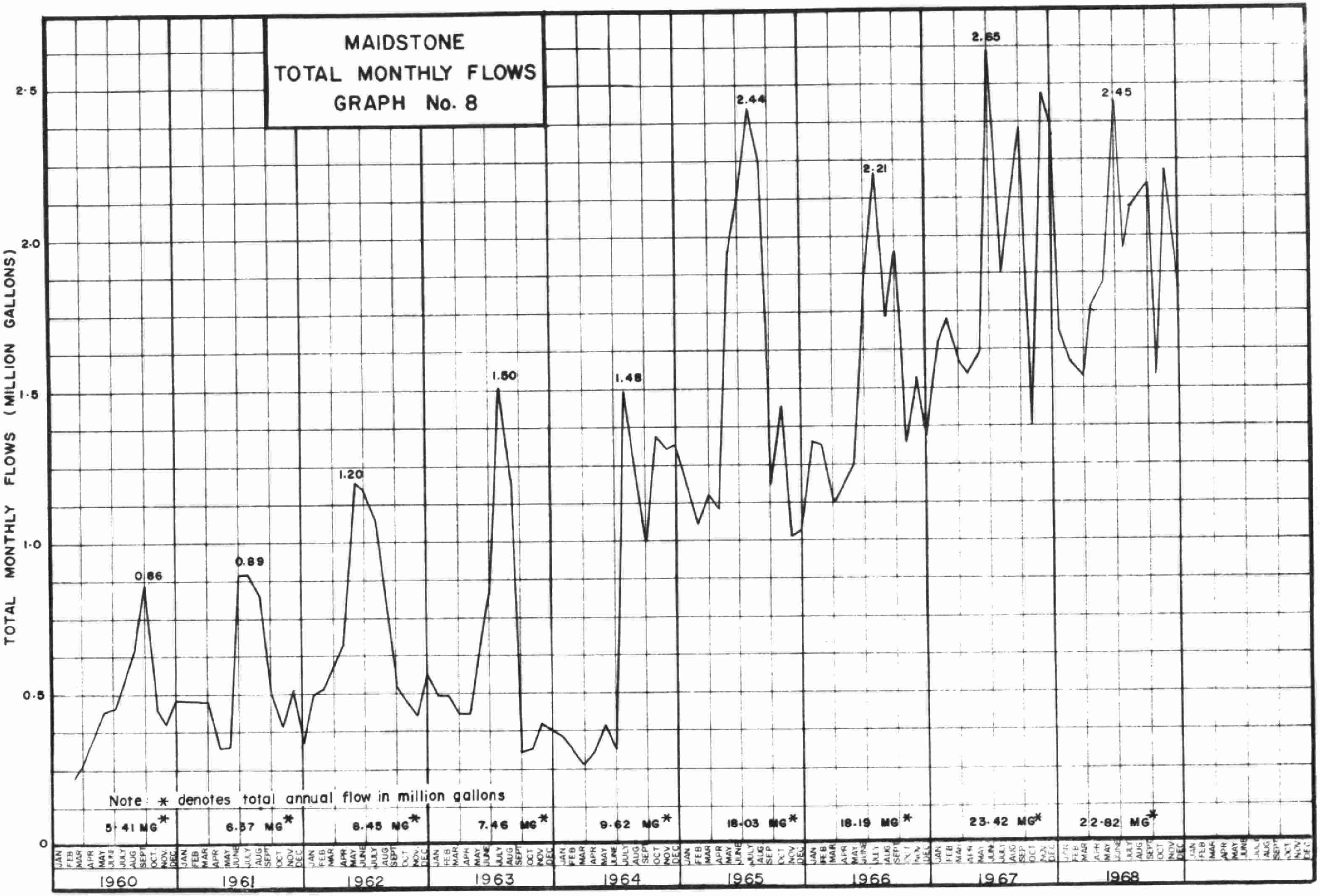
ESSEX
TOTAL MONTHLY FLOWS
GRAPH No. 4

Note: * denotes total annual flow in million gallons


MERSEA
TOTAL MONTHLY FLOWS
GRAPH No. 5
Note: * denotes total annual flow in million gallons
TOTAL MONTHLY FLOWS (MILLION GALLONS)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0
9.0
16.0
25.0
25.0
20.9
25.7
23.4
27.7
24.0
55.70 *
79.85 *
99.51 *
137.71 *
127.96 *
168.68 *
158.53 *
165.23 *
160.61 *
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC
1960
1961
1962
1963
1964
1965
1966
1967
1968


GOSFIELD SOUTH
TOTAL MONTHLY FLOWS
GRAPH No. 6
Note: * denotes total annual flow in million gallons
TOTAL MONTHLY FLOWS (MILLION GALLONS)
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0
2.6
7.2
15.4
16.0
13.0
18.7
16.6
20·8
12·8
16.34 *
37.29 *
51.74 *
74.96 *
75.01 *
99.12 *
87.369 *
102.661 *
83·124 *
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT. NOV. DEC
1960
1961
1962
1963
1964
1965
1966
1967
1968


GOSFIELD NORTH
TOTAL MONTHLY FLOWS
GRAPH No. 7
TOTAL MONTHLY FLOWS (MILLION GALLONS)
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
2.2
2.5
3.2
5.0
2.6
4.14
5.638
4·91
6·397
Note: * denotes total annual flow in million gallons
9.95*
13.13*
21.60*
29.53*
23.35*
30.06*
32.932*
31.058*
35·817*
JAN FEB MAR APR MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
1960
1961
1962
1963
1964
1965
1966
1967
1968

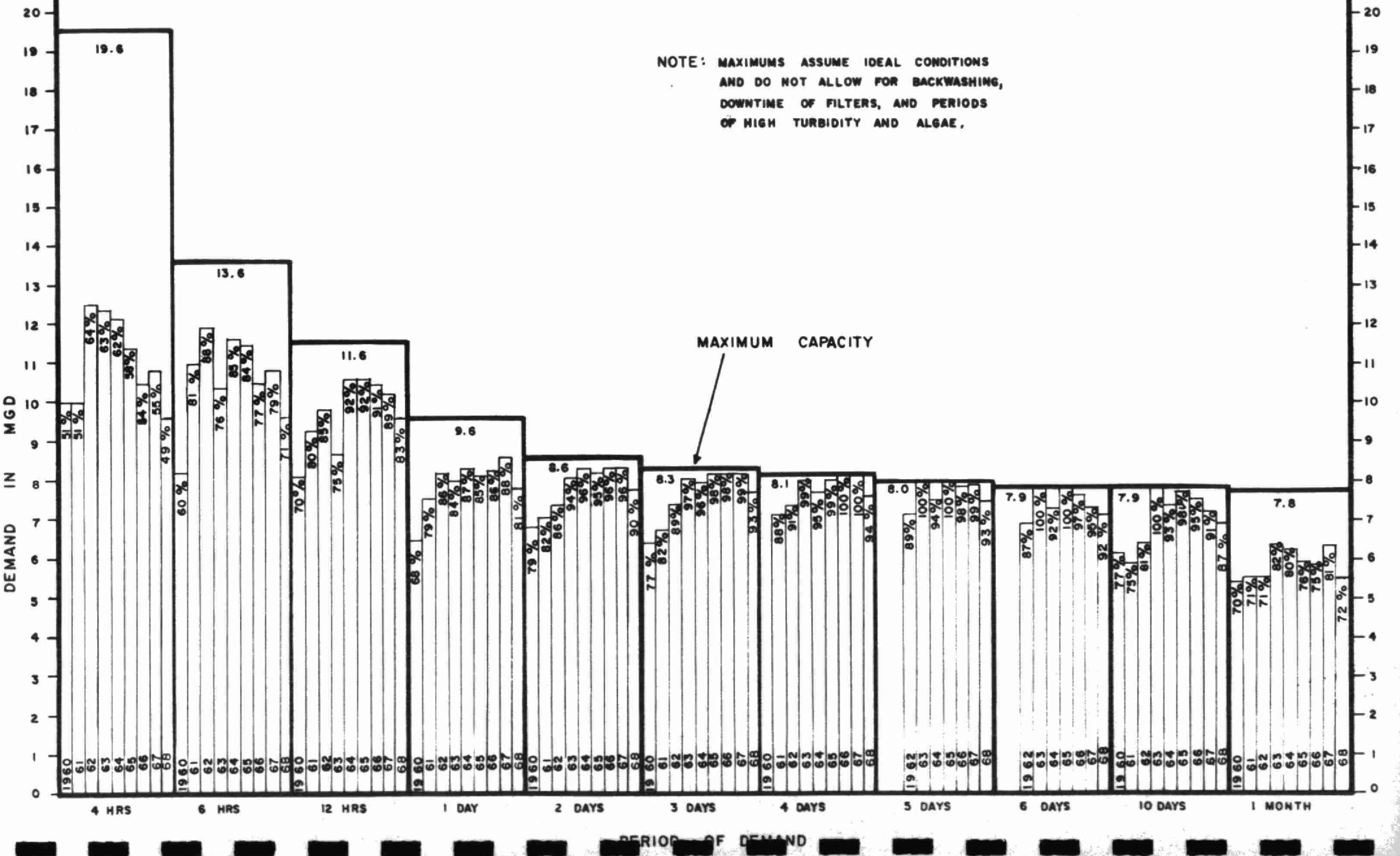

MAIDSTONE
TOTAL MONTHLY FLOWS
GRAPH No. 8

Note: * denotes total annual flow in million gallons

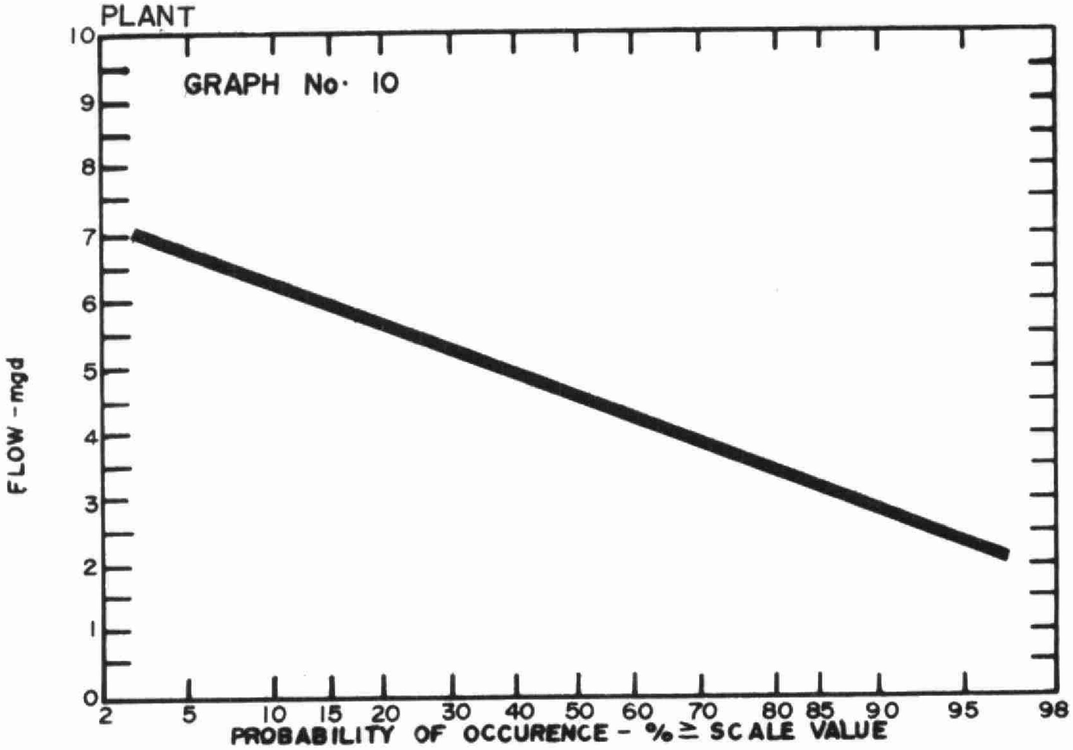
PEAK DEMAND AS A PERCENTAGE OF DESIGN CAPACITY

(BASED ON PLANT METER)

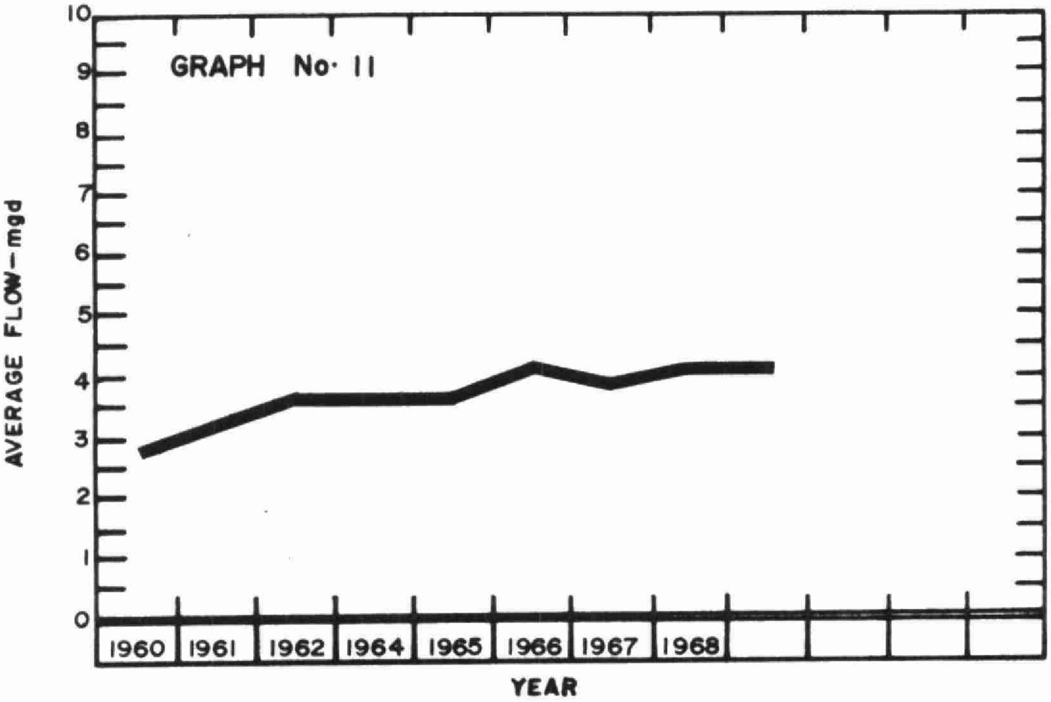
GRAPH No. 9



NOTE: MAXIMUMS ASSUME IDEAL CONDITIONS AND DO NOT ALLOW FOR BACKWASHING, DOWNTIME OF FILTERS, AND PERIODS OF HIGH TURBIDITY AND ALGAE.


PLANT
GRAPH No· 10
FLOW - mgd
0
1
2
3
4
5
6
7
8
9
10
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98
PROBABILITY OF OCCURENCE - % ≥ SCALE VALUE

FLOWS


GRAPH No· 11
AVERAGE FLOW - mgd
0
1
2
3
4
5
6
7
8
9
10
1960
1961
1962
1964
1965
1966
1967
1968
YEAR

WATER QUALITY

CHEMICAL PROPERTY	RAW WATER				TREATED WATER				DESIRABLE STANDARDS
	No. of Samples	Avg.	Max.	Min	No. of Samples	Avg.	Max.	Min.	
HARDNESS mg/l $CaCO_3$	35	123	142	110	23	125	134	100	< 100
ALKALINITY mg/l $CaCO_3$	35	90	100	80	20	82	102	60	30-100
IRON mg/l Fe	35	0.80	2.00	0.08	20	0.10	0.34	0.0	< 0.3
COLOUR Units	33	12	30	5	18	5	5	5	< 5
CHLORIDE mg/l Cl	35	25	33	20	23	27	37	19	< 250
TURBIDITY JTU	365	19.4	200	5	365	0.2			< 1.0

COMMENTS

HARDNESS

The hardness of the raw water averaged 123 mg/l $CaCO_3$ and the treated water averaged 125 mg/l. This is considered to be a moderately hard water.

ALKALINITY

The alkalinity of the raw water at 90 mg/l was reduced to 82 mg/l in the treatment process.

IRON

The average iron content in the raw water is above the recommended limit of 0.3 mg/l, however, treatment reduces this value to 0.1 mg/l.

COLOUR

The treated water has a colour rate of less than 5 units which is below the recommended upper limit of 5 units.

CHLORIDE

The average chloride content of the raw and treated water was well below the recommended limit of 250 mg/l.

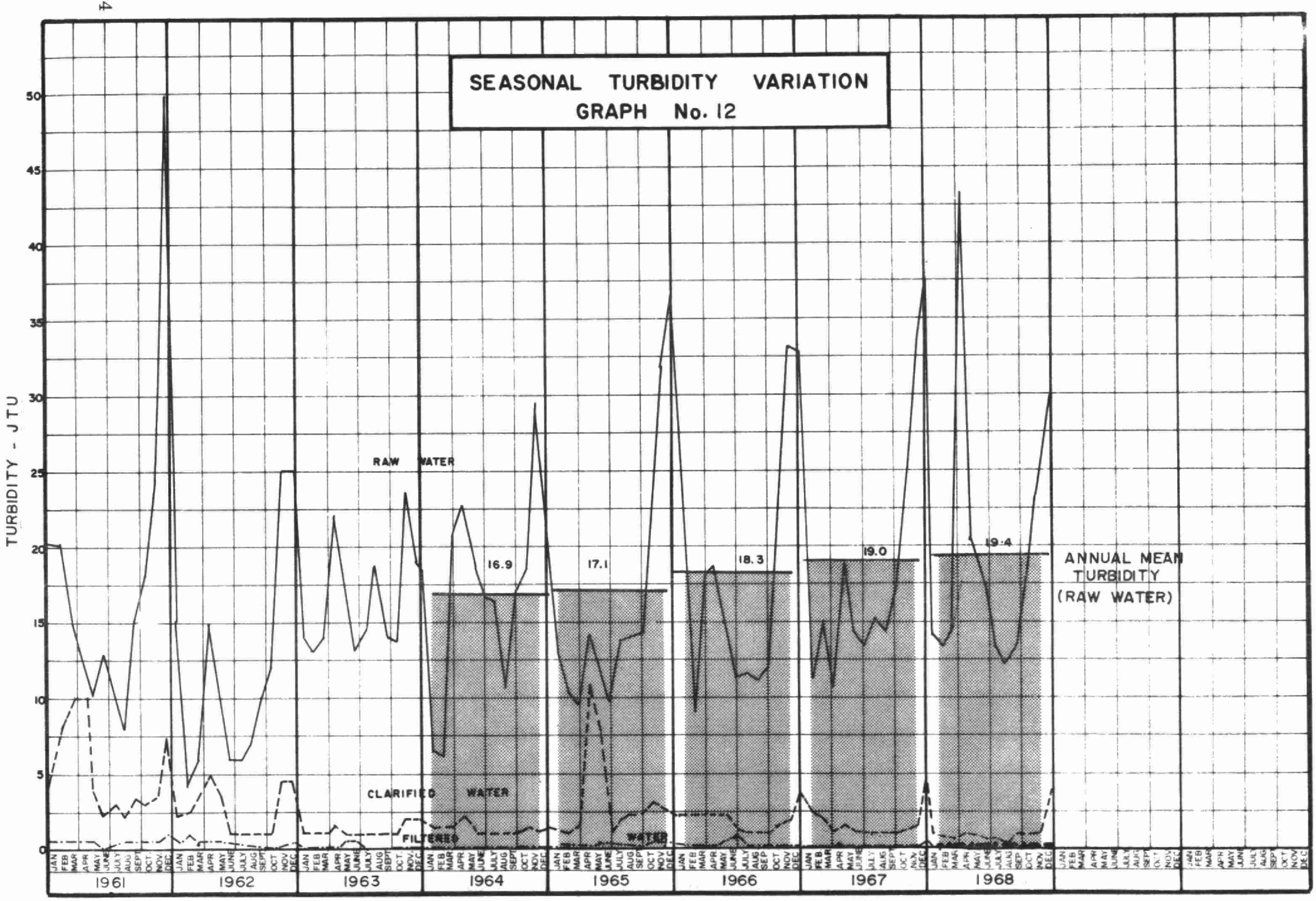
RAW WATER TURBIDITY VARIATION

Graph No. 11 of seasonal turbidity variation by months, shows that the 1968 turbidity averaged 19. 4 mg/l and that the 1968 peak occurred in April. The turbidity of the clarified water averaged 1. 7 mg/l and the filtered water remained at a very satisfactory level of 0. 2 JTU. The overall removal efficiency held at better than 99%.

The turbidity of the treated water at 0. 2 units is well below the recommended limit of 1 unit (JTU).

The following table shows average turbidity variations for raw, clarified and filtered water over the past five years:

Year	Raw Water	Clarified Water	Filtered Water
	(in Jackson Turbidity Units)		
1964	16. 9	1. 3	0. 2
1965	17. 1	3. 2	0. 2
1966	18. 3	1. 9	0. 3
1967	19. 0	1. 7	0. 2
1968	19. 4	1. 7	0. 2



SEASONAL TURBIDITY VARIATION
GRAPH No. 12

COLIFORMS AND ALGAE

Month	COLIFORMS				ALGAE (Raw Water)			
	RAW WATER		TREATED WATER					
	No. Samples	No/100 ml Average	No. Samples	Density No. > 0/100 ml	No. Samples	*A. S. U. /100 ml Max.	Min.	Avg.
January	5	200	60	1	5	8724	4310	6121
February	4	1000	48	0	4	5890	4747	5242
March	4	10	47	0	4	5152	3324	3984
April	5	100	60	0	5	8593	5200	6414
May	4	400	55	0	4	5381	2601	4187
June	4	3400	48	5	4	4037	2920	3558
July	5	1100	70	5	5	3968	1273	2755
August	4	200	48	1	4	7042	3426	5218
September	4	3100	68	3	5	5300	3062	4229
October	5	300	68	0	4	5385	3819	4625
November	4	3400	46	1	3	4793	3918	4285
December	4	1700	45	0	6	7158	3557	5638
Total	52	-	663	16	53	-	-	-
Average	4	1200	55	-	4	5952	3513	4688

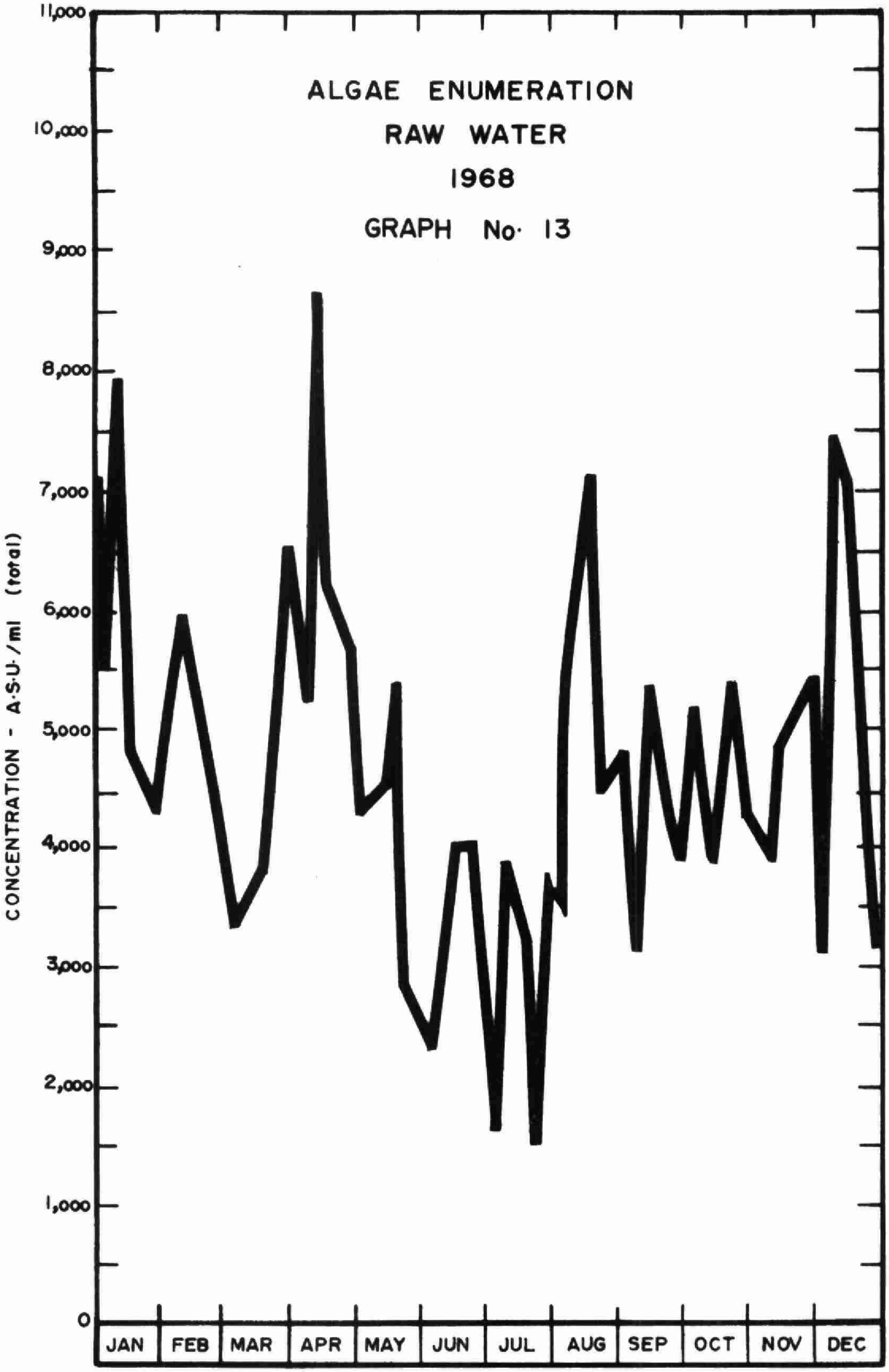
COMMENTS

COLIFORMS

The average number of coliforms per 100 ml of raw water sample was 1200, and ranged from 10 to 3400. Of a total of 663 samples taken throughout the distribution system, only 16 showed the presence of coliforms. These 16 samples did not show a high enough count to warrant further investigation by the Department of Health who sample the system.

ALGAE

The average algae concentration was 4688 A. S. U. /100 ml. The actual counts ranged from a low of 1273 units to a high of 8724 units. These values are quite high in comparison to most areas in the Great Lakes. Graph No. 13 shows the yearly variation.


ALGAE ENUMERATION
RAW WATER
1968
GRAPH No· 13
CONCENTRATION - A·S·U·/ml (total)
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

PROCESS CHEMICALS

MONTH	ALUM		* ACTIVATED CARBON		CHLORINE		
	Pounds Used	lbs per mil gal	Pounds Used	lbs per mil gal	Total Used Pounds	Prechlor. Dosage mg/l	Postchlor. Dosage mg/l
January	15216	154	150	2	1985.00	1.5	0.5
February	15555	177	0	0	1953.50	1.6	0.5
March	14327	147	0	0	2289.50	1.8	0.6
April	15572	148	170	2	3245.00	2.3	0.8
May	16211	136	140	1	3509.50	2.2	0.7
June	20079	137	0	0	6520.00	3.3	1.1
July	21647	144	315	2	7781.00	3.9	1.3
August	25064	144	375	2	7196.25	3.1	1.0
September	23786	145	455	3	6555.00	3.0	1.0
October	19280	151	280	2	5325.00	3.1	1.0
November	16274	146	210	2	2835.00	1.9	0.6
December	13931	142	0	0	1780.00	1.4	0.5
Total	216942	-	2095	-	50974.75	-	-
Average	18079	148	262	2	4247.90	2.4	0.8

* Average lb/mg when applied

COMMENTS

CLARIFICATION

In order to operate the reactivator clarifier a total of 216,497 lbs. of Alum ($Al_2O_3 - 28H_2O$) was used as a coagulant. This represents an average of 147 lbs. per million gallons treated. In 8 months of the year, activated carbon was required to control taste and odour. A total of 2,095 lbs. was required for an average of 1.4 lbs. per million gallons treated, based on the years totals, or 2 lbs. per MG when required.

CHLORINATION AND DISINFECTION

During 1968, an average dosage of 2.4 mg/l of chlorine was used in prechlorination to maintain a residual of 0.15 mg/l. An average dosage of 0.8 mg/l of chlorine was used in post-chlorination to maintain a residual of 0.5 mg/l in the treated water pumped to the distribution system. A total of 50,974 pounds of chlorine was used. This is an increase over consumption in 1967 in spite of lower flows. There was a slight increase in the chlorine demand over 1967 indicating a slight deterioration in the quality of the raw water.

Date Due

COPY #1

LABORATORY LIBRARY
96936000119896

CONCLUSIONS

During 1968, the maximum demand equalled or exceeded 90% of the plant capacity over periods from two to six days. The total output decreased by 3.2 percent and the peak month was 11.5 percent lower than in 1967. The plant load factor was 0.534 as compared to 0.553 in 1967, 0.536 in 1966 and 0.554 in 1965. The cost for production was 9.37 cents per 1000 gallons or 1.87 cents per ton as compared to 8.65 and 1.73 cents respectively in 1967.

Turbidities in the raw water followed much the same pattern in 1968 as in 1967, except that the peak occurred in April rather than late in the year. Slightly higher chlorine requirements indicate a slight deterioration in the raw water quality.

Water management in Ontario